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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/704,641	11/01/2000	Maximilian Albert Biberger	SSI-00700	4503

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HAVERSTOCK & OWENS LLP
162 NORTH WOLFE ROAD
SUNNYVALE, CA 94086

EXAMINER
KACKAR, RAM N

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1763	23

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.

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The information disclosure statement filed 10/30/2002 fails to comply with 37 CFR 1.97(d) because it lacks a statement as specified in 37 CFR 1.97(e). It has been placed in the application file, but the information referred to therein has not been considered.

The information disclosure statement (IDS) submitted on 2/13/2003 was filed after the mailing date of the final rejection on 10/25/2002. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 22

Application Number: 09/704,641
Filing Date: November 01, 2000
Appellant(s): BIBERGER ET AL.

Thomas B Haverstock
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/20/2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is deficient because after 5th sentence the description to a process is not part of the invention examined.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct except for the change as below:

Issue 1 is removed as claim rejections under ***35 USC § 112*** are withdrawn.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1-25 and 29-30 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

6110232	Chen et al	8-2000
5979306	Fujikawa et al	11-1999
5928389	Jevtic	7-1999
5882165	Maydan	3-1999
6244121	Hunter	6-2001
6186722	Shirai	2-2001

6235634 White et al 5-2001

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims1-10, 13, 15-17, 19-20, 22-25 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US Patent 6110232) in view of Fujikawa et al (US Patent 5979306).

Chen et al disclose a cluster tool comprising a transfer module (Fig1-20) having an entrance (attached to load locks 12 and 14), a non-supercritical module coupled to the transfer module (Fig3-32), a transfer mechanism coupled to the transfer module which is configured to move the work piece between the entrance, and any other processing module coupled to it (Fig 3-28), means for injecting inert gas like nitrogen to allow the pressure in the transfer chamber to be slightly positive (Col 2 line 22-25), two hand off stations (Fig 3-14 and 12) adapted in two load locks at the entrance of the transfer module, non supercritical module to be a semiconductor module of the type of an etch, PVD or CVD (Col 1 line 14-21), the transfer mechanism to be a central robot (Fig 3-28) adapted in a circular configuration, the robot arm to comprise an

extendable arm and an end effector (Fig 3-28) and the transfer module to be vacuum capable (Fig 1-20).

Chen et al disclose spare capacity to connect additional future process modules to its transfer module (Col 1 lines 44-46) but do not disclose a supercritical module connected to it.

Fujikawa et al disclose a module capable of doing supercritical processing (Col 1 line 9-14) and capable of being connected to a robot type transfer mechanism in a vacuum chamber (Col 7 lines 24-29) and further comprising:

a pressure vessel (Col 3 line 21), a work piece cavity (Fig 4-5) for holding a work piece during processing, ingress and egress for the work piece (Fig 2-14), placement of the work piece in the work piece cavity through the transfer mechanism (Col 7 line 25-29), a pressurizing means for the supercritical processing module (Fig 4-26 and Col 8 line 12-25) and sealing means (Fig 1B-9 and Col 5 line 44) for the entrance of the supercritical processing module.

Therefore it would have been obvious to one having ordinary skill in the art at the time invention was made to connect the supercritical module of Fujikawa to the transfer module of Chen et al in order to enable the upgraded cluster tool to do supercritical processing in sequence with non-supercritical processing on a substrate in its clean environment and reduced cycle time so as to increase the throughput.

With regard to claim 20 the limitation of pressurizing CO_2 is directed to an intended use of the claimed apparatus and does not structurally distinguish over Fujikawa. As discussed above, the means to pressurize are disclosed by Fujikawa (Fig 4-26 and Col 8 line 12-25) and using these means to pressurize CO_2 would be obvious.

Claims18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US Patent 6110232) in view of Fujikawa et al (US Patent 5979306) as applied to claim 16 and further in view of Jevtic (US Patent 5928389).

Chen et al do not disclose an antechamber coupling the transfer module and the supercritical process module.

Jevtic discloses a combination of a process chamber (Fig 1-110) and a transfer chamber (Fig 1-112). This meets the definition of an antechamber as per the specification. Use of additional transfer chamber is common to do preprocessing in an optimized scheduling environment to increase the throughput.

Therefore it would have been obvious to one having ordinary skill in the art to place an additional module with transferring capabilities before a processing module so as to be able to do any pre-processing needed before placing in the supercritical module.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maydan et al (US Patent 5882165) in view of Fujikawa et al (US Patent 5979306). Maydan discloses a hand off station (Fig 1-14), several non-supercritical modules coupled to the hands off station, a transfer mechanism configured to move the work piece between the entrance and the modules coupled to it.

Maydan et al do not disclose a supercritical module coupled to the hand off station.

Fujikawa et al discloses a module capable of doing supercritical processing (Col 1 line 9-14).

Therefore it would have been obvious to one having ordinary skill in the art to couple the supercritical module to the transfer module of Chen et al to combine supercritical processing step

with other processing on a wafer without taking the wafer out of clean environment between steps.

(11) Response to Argument

Claim rejections under 35 USC § 112 have been withdrawn.

Claim rejection under 35 USC § 103 stand.

Chen et al discloses a generic cluster tool with spare capacity for additional process modules. Fujikawa discloses a high-pressure module capable of doing supercritical processing and capable of connecting to the transfer module of Chen et al.

With the known advantages of cluster tools in regards to better quality due to reduced contamination and high throughput one skilled in the art would be motivated to connect Fujikawa module to Chen et al cluster tool to get the invention claimed in claim 1.

The appeal brief draws heavily from the declaration of Dr Moslehi. Examiners answer to that declaration is part of the final rejection.

Appellant argues that Fujikawa discloses a stand-alone high pressure-processing chamber, and provides no motivation to combine a supercritical and non-supercritical processing module in a cluster tool.

Fujikawa discloses a high pressure processing chamber which can be connected to a robot arm for loading or unloading a work piece (Col 7 lines 24-29) and thus provides a motivation to connect a high pressure supercritical module to a transfer chamber. Fujikawa alone does not provide a motivation to combine a supercritical module and a non-supercritical module in a cluster tool.

Appellant argues that Fujikawa makes one passing reference to supercritical processing, does not teach how to perform supercritical processing and does not teach how to attach a supercritical processing module to a non-supercritical processing module.

Fujikawa discloses an apparatus designed for high pressure gas processing, which could do a washing process by a fluid in supercritical state. The point about Fujikawa not teaching supercritical processing is not commensurate to the scope of the claims as the claims being examined relate to an apparatus and not a process. Thirdly, the supercritical module and non-supercritical modules are not claimed to be attached to each other directly. As discussed before Fujikawa alone does not teach both a supercritical and a non-supercritical module attached to a cluster tool.

Appellant argues that Chen et al do not teach a supercritical processing chamber or combining a supercritical processing chamber with a non-supercritical processing chamber on a single cluster tool.

It is agreed that alone neither Chen nor Fujikawa teach a combination of supercritical and non-supercritical modules on a single cluster tool. Chen however discloses a cluster tool with spare capacity (Col 1 lines 44-46) for accepting modules dedicated to other processes.

Appellant argues that on the filing date, one skilled in the art would have found no motivation to combine Fujikawa and Chen to produce the inventions recited in claim 1 and 29.

Examiner disagrees. As stated by the examiner in all office actions, the motivation to connect the supercritical module of Fujikawa to the transfer module of Chen et al with other non supercritical modules already connected to it, would be to enable the upgraded cluster tool to do supercritical as well as non-supercritical processing sequentially on a substrate in a clean

environment with reduced cycle time to increase the throughput and improve the quality of the processed substrate. There has been an industry wide trend for manufacturers to upgrade from dedicated process modules to integrated environment of cluster tools to get the advantage of high throughput and high quality (Chen et al Col 1 lines 32-42).

Quoting from Dr. Moslehi, the appellant argues that it would not have been obvious to combine the high-pressure chamber in Fujikawa with the processing system of Chen et al. The appellant further argues that without special precautions and utilizing features there would be cross contamination and gas leakage.

Examiner disagrees. Fujikawa has very clearly disclosed the connection of a high-pressure module to a robot arm in vacuum (Col 7 lines 23-29). If the high-pressure module connects to the cluster tool of Chen et al it would connect only to a transfer module. Process modules maintain their processing environment hermetically sealed by using valves and are isolated from each other and from transfer module (Chen Col 1 lines 50-51). Transfer module communicates to process modules one at a time for loading or unloading a substrate. Fujikawa discloses seals at high pressure to prevent gas leakage (Col 3 lines 32-35 and Col 4 lines 26-41). Chen et al disclose valves on all other process modules (Col 1 lines 50-51). The specification does not disclose any structural features which would imply anything beyond these prior art disclosed valves and seals to prevent gas leak and cross-contamination.

The appellant argues that the examiners final office action impermissibly uses what is taught in the 641 patent application to find a motivation to combine.

The examiner disagrees. The advantages of a cluster tool as regards improved quality due to lack of contamination and high throughput have been known for a long time. For example

Chen et al has disclosed the advantage of lack of contamination provided by a cluster tool (Col 1 lines 22-42). The advantage of high throughput is evident from the fact that cluster tool provides very short time for transferring substrates from one process module to another. Compare this to transfer a substrate from one dedicated processing system to another when several hundred processing steps may be needed (Chen et al Col 1 lines 14-21). The practice of using cluster tools in semiconductor manufacturing has been so common that Semiconductor Equipment and Materials International (SEMI), has developed standards to enable seamless integration of process modules from different vendors to a common transfer module in a cluster tool environment. The motivation is universal and not learnt from '641 application.

Appellant has argued that claim 20 is allowable over Fujikawa.

As explained in grounds of rejection the disclosed apparatus of Fujikawa contains the means to pressurize any gas (Fig 4-26 and Col 8 line 12-25) and using these means to pressurize CO_2 would be obvious.

Appellant argues that no motivation is provided to combine Chen as modified by Fujikawa and Jevtic.

This is not true. The motivation originated from Jevtic and is clearly stated in the rejection (Col 1 lines 57-65). The specification has not provided any definition of antechamber except that it is a transfer chamber disposed between a process module and the main transfer module.

Appellant argues that transfer chamber of Jevtic could not be an antechamber because of not being small.

Appellant has attributed characteristics to the antechamber, which are not supported by the specification. Regarding size, if the antechamber contains a robot it will have to be at least as big as the robot. Besides, transfer modules always have low height (See Chen et al Fig 1-20) and low volume to allow for fast evacuation and fast venting.

Appellant argues that combining a supercritical processing module and a non-supercritical processing module on a cluster tool platform would not have been obvious to one skilled in the art on the filing date without the process integration drivers being identified, as in the '641 application.

The process integration drivers do not appear to be referring to any structural limitation and therefore not relevant to apparatus claims under rejection.

Appellant argues that without knowledge of the process apparatus of Fig 5 (schematic representation of support system for supercritical module) and Fig 3 (process sequence) the combination of Maydan and Fujikawa would fail.

In other words if the apparatus is operated with the knowledge obtained from Fig 5 and 3 the apparatus will work OK. But this implies process knowledge, which does not say that combination would fail.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

RK
March 19, 2003

Conferees
Glenn Caldarola
Ben Utech

HAVERSTOCK & OWENS LLP
162 NORTH WOLFE ROAD
SUNNYVALE, CA 94086

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700